Westinghouse

ELECTRIC CORPORATION

AIR ARM DIVISION

A62 10R

PHONE: SOUTHFIELD 1-1000
FRIENDSHIP INT'L AIRPORT
BOX 746, BALTIMORE 3, MD.

September 27, 1961

Special Project Office (LMBA-1)
Plans & Programs Office
Directorate of Production
Wright-Patterson AFB, Ohio

SUBJECT: Monthly Progress Report
Contract AF33(600)40280

Enclosure: (1) Three (3) copies Monthly Progress Report for period from July 15 to August 15, 1961.

Gentlemen:

Enclosure (1) is submitted as required by the subject contract. One copy of this report is also being sent to [redacted] 25X1

Very truly yours,

25X1

[redacted]
Interceptor FCS Project
Air Arm Division - 251

cc: [redacted] 25X1

IF ENCLOSURES ARE WITHDRAWN OR NOT ATTACHED, THE CLASSIFICATION OF THIS LETTER MAY BE DOWNGRADED ACCORDINGLY IN ACCORDANCE WITH DOD 5200.1 OR NAVY REGULATION ART. 76 (5) (c).

SECRET

Progress Report

Period of 7/15/61 to 8/15/61

Contract No. AF 33(600)40280

General

Major activity for the monthly reporting period was in the fabrication, shop follow and test specification preparation stages of the various units and sub-assemblies.

Approximately 94% of the fabrication drawings have been released to the Model Shop and indications are 98% completion will be achieved during the next period.

The chart on page 2 shows in graphical form the overall program status.

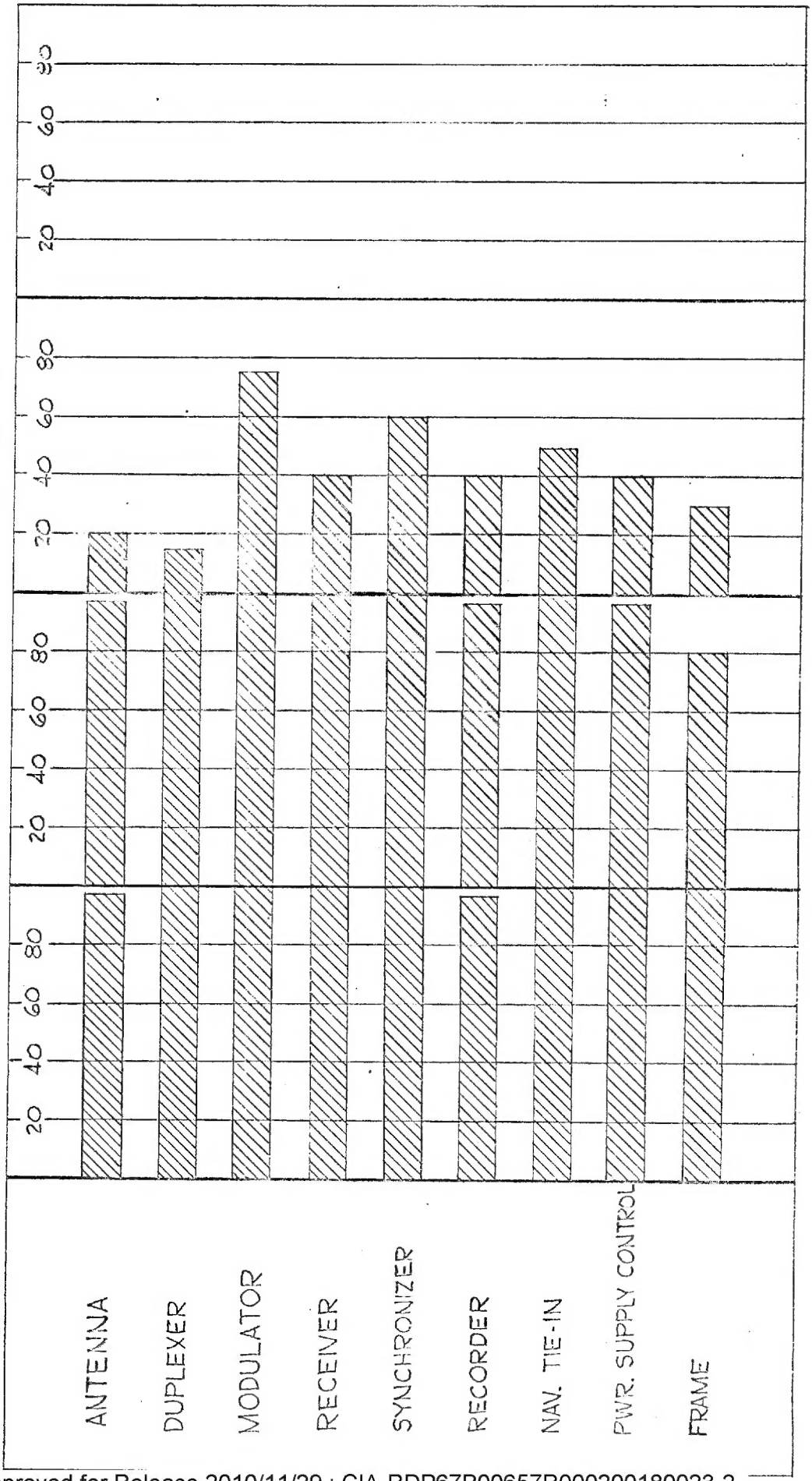
Page 3 shows a graph of drawing releases to the Model Shop.

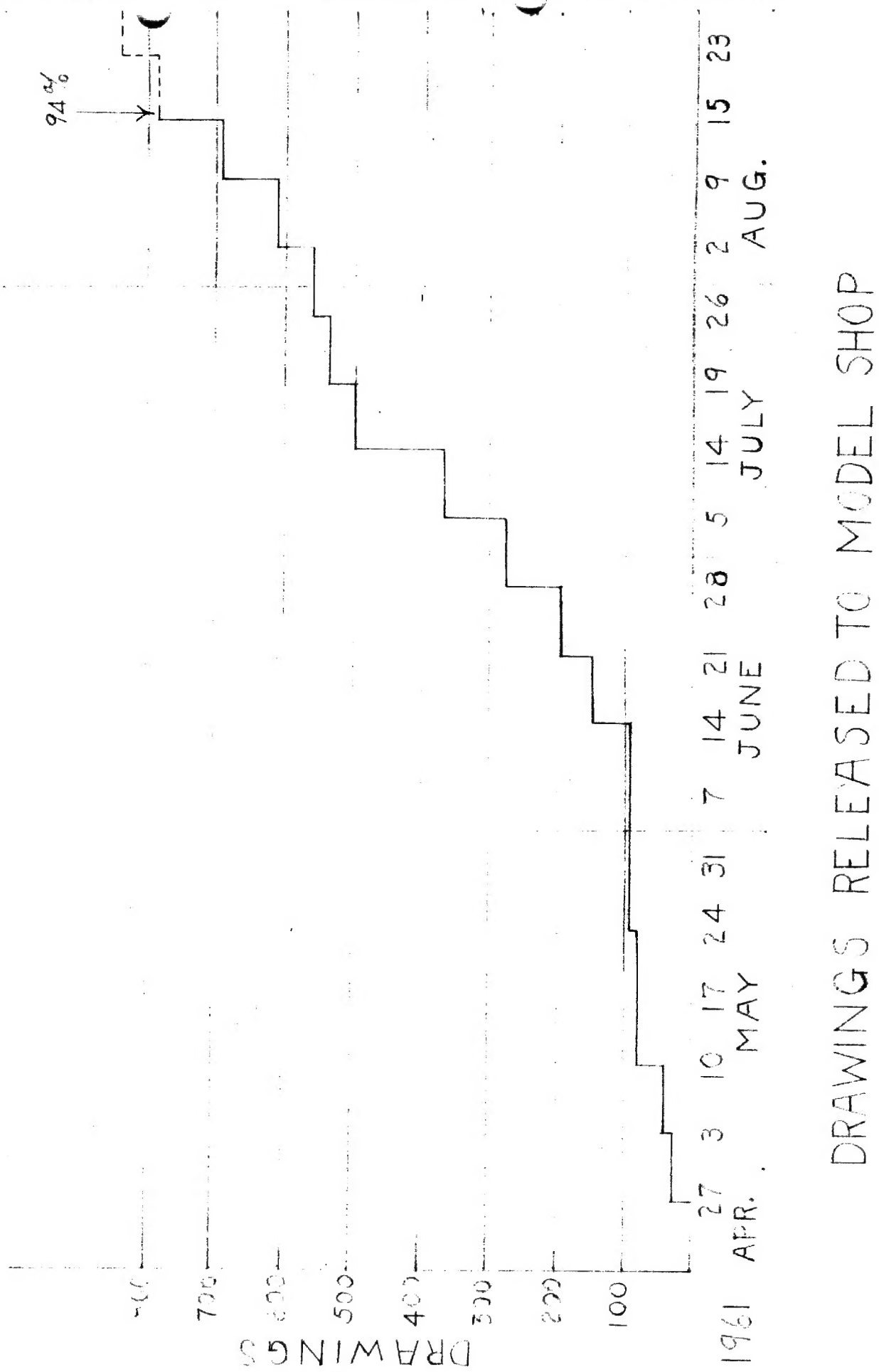
Test Specifications

Preliminary test specs were submitted for approval on 14 August 1961 per contract requirement.

PROJECT STATUS

% COMPLETION OF 1ST RADAR FOR PERIOD ENDING 15 AUGUST 1961





Auxiliary Data Recorder

We are awaiting customer approval of a proposal covering the addition of an auxiliary data recorder to the radar.

Flight Test

A revised flight test proposal was submitted deleting procurement of navigational system, considering it to be government furnished equipment.

ANTENNA

Structure Analysis

A new honeycomb beam is being designed for the flight test program. Calculations are being performed to select the proper thickness of bonded aluminum honeycomb.

Radome Laminate Design

DuPont ML laminate has proved to be an acceptable seal after being cycled at high temperature for over 600 hours. A method of bonding has been developed which consists of etching the nickle waveguide with ferric chloride, coating it with ML varnish, and letting it air dry. An uncured strip of ML laminate is then laid over the stick after both pieces have been moistened with solvent. The assembly is subjected to an oven cure. Inasmuch as DuPont will not supply uncured laminate, the Micarta Division of Westinghouse is impregnating the glass cloth with ML varnish which has been purchased from DuPont.

Metal "C" rings coated with silicon rubber have been selected for sealing the waveguide flanges after having been successfully cycle tested for over 500 hours at high temperature.

Load Design

The supplier reviewed his design and ordered new test equipment after a meeting at Westinghouse Air Arm Division and is ready to ship new loads starting the week of 14 August 1961.

Outside Radome

Sample panels of A and B sandwich construction have been ordered per details supplied by Air Arm. Evaluation will commence immediately upon receipt of the material.

Fabrication

The following purchased items are due as listed:

Array Sticks	- 2 sets by 30 Aug. 1961
Manifold	- 2 units by 30 Aug. 1961
Stainless Steel Honeycomb Beam	- 1 unit by 31 Aug. 1961
Power Divider	- 18 Sept. 1961

DUPLEXER DRIVER

25X1

Westinghouse received the [redacted] resonant ring from [redacted] and 25X1
tests indicated a gain of approximately 12 db (without switches).

Above 150 kw, corona and breakdown were evident in the sidewall and top wall of the hybrid section. Airtron expects to correct this by 25X1
machining instead of brazing the hybrid section and plans to supply [redacted]
with one of these units.

Delivery of unit #1, the Westinghouse invarsilver laminate ring has been promised for the week of 25 September 1961 by [redacted] 25X1

All drawings have been released and fabrication has started.

Layout of the resonant ring and associated components is complete and detailing is 90% complete. Drawing release date is expected to be 28 August 1961.

Switch Tubes

Early in this period, a tube was constructed which had dimensions used in the theoretical analysis. In particular, the tube consisted of a small bore capillary containing electrodes for DC sweeping and triggering. The small diameter (.040 inch) capillary was selected to increase the diffusion of electrons to increase breakdown power. The tube did not perform as expected. The first difficulty encountered was the heating of the capillary to several hundred degrees centigrade by the incident RF field. The heating occurred both for an evacuated tube and for a tube with a few tenths of a torr. pressure of helium. In addition the heating occured for very low incident power levels (10-20 kw). The addition of the gas cooled the capillary slightly and raised the power at which heating began by only a few killowatts. The second difficulty encountered was the low firing power of the tube with a low pressure of helium. Another fault of the tube was the high insertion loss which resulted from the geometry of the resonant gap structure.

At present an evaluation is being made of structures without the capillary tubing. By using larger diameter electrodes with small gaps, it is expected that a large diffusion coefficient can be obtained in order to control breakdown. However, with this design the difficulty of high insertion loss must be overcome.

POWER MONITOR

Lab tests indicate a peak power accuracy of ± 6% from -55°C to +71°C.

Fabrication is proceeding satisfactorily.

MODULATOR

Power outputs up to 75 kw were obtained with the new power amplifier klystron installed in the breadboard model. However, difficulties in the form of intermittent arcing were traced to the pulse package (PFN, pulse transformer). A similar failure occurred with the prototype unit connected into the breadboard modulator after 28 minutes of operation at full voltage.

Inspection of both units by the supplier revealed that arcing from the high voltage end of the pulse transformer winding to the core had resulted in ruptured case seals due to the increased gas pressure.

Further tests conducted by the supplier on two units ready for shipment failed in the same manner and the supplier's conclusion is that improper processing (not a design deficiency) is the cause of the failures.

Mock-ups of these parts are being used by the Model Shop in order to avoid delays in wiring.

The modulator test specification has been released and the test unit is complete except for connectors which are on order.

RECEIVER

TWT

Fabrication of the TWT mounting bracket is approximately 80% complete and delivery of three TWT's is scheduled by the manufacturer as follows:

1 TWT - 1 Oct. 1961

1 TWT - 1 Nov. 1961

1 TWT - 1 Dec. 1961

I.F. Amplifier

Most of the assembly and some of the wiring has been done on these units. Upon receipt of the transformers and coils they can be completed.

Video Amplifier

A connector change was made to improve mating with the recorder. These units are ready for assembly and wiring.

SYNCHRONIZER

Frequency Generator

Individual chassis assembly is starting this week, no known difficulties exist.

25X1

The oscillator-discriminator from [redacted] is scheduled for delivery on 25 August 1961.

25X1

Receiving and inspection is now testing the coils from [redacted] These items are required to complete tests on the breadboard.

Synchronizer Generator

The three counter logic boards are scheduled for delivery to Engineering this week. These units contain a set of substitute capacitors of incorrect physical size which will be changed upon receipt of the correct capacitors.

Synchronizer Chassis

This chassis is completely assembled and is now being stencilled prior to adding components.

Summing Network

All of these units have been received by Engineering for testing.

Stalo and Receiver Chassis

One phase detector-amplifier has been modified and delivered to Engineering for testing. Several substitute parts will be used in the tests which will start on 21 August 1961.

The receiver chassis has been fabricated and marked.

Fabrication of waveguide parts has started.

A second Bomarc stalo is scheduled from manufacturing on 21 August 1961.

RECORDER

General

Electronic and mechanical assembly of the first recorder is well under way. Some delays have been encountered due to late delivery of the CRT, the fiber optics array and some special capacitors and relays.

Electronic

The first of the 1 Mil CRT's have been received but no tests have as yet been made to determine the spot size.

Optics

The fiber optics unfolding array has also become a problem, in that a sample adequate for use has not been received. The manufacturer is now assembling the second attempt at an optical quality sample, (the first sample was overheated and fused during the folding operation). Receipt of this second unit is expected in the next two weeks.

It has been realized during the past month that the resolution that will obtain on the second recording may not be that of the fibers or spot size because of the finite thickness of the film emulsion. In some photographic tests it was found that the resolution of a contact point made through a fiber bundle was very dependent upon the degree of diffusion of the light source; a very diffuse light source such as a CRT phosphor gave a resolution figure only one half as good as a point source. This effect is due to the large cone angle of light emitted from the fibers onto the emulsion. It is possible to obtain fibers with smaller cone angles, but at the expense of a loss of light. This will be investigated as soon as light level measurements have been made on the new tube.

Mechanical

Assembly of the recorder is proceeding as parts are completed and initial testing of the film transport has been started. Some difficulty has been encountered in film tracking and this is under investigation. So far, split rollers under the loop drive rollers have been changed to a continuous roller which eliminated film buckling between the split rollers.

Assembly of the auxiliary data projector has been started and is proceeding on schedule. The magnetic shield is being modified to accommodate the present tube and yoke support.

The outside enclosure was released for fabrication and this is the last unit to be released except for shipping cases.

Test Program

There have been several discussions during the past month about the testing program and the modifications that must be made to the recorder to permit operation in the F-101 vehicle. The sweep circuits will be modified to permit operation at the new ranges and still give data that can be processed.

NAVIGATION TIE-IN

A shortage of some purchase parts is a partial result of the late release of the revised drawings. One of these items, the motor-assembly for the pitch channel, will require some effort to speed up delivery.

The lab is now engaged in making a test panel and angle measuring tool for unit testing.

Fabrication of the chassis assembly has started.

POWER SUPPLY AND CONTROL

All drawings on the power supply have been released except for the following:

a. Installation Drawing

b. Low Voltage Wiring Diagram

c. Low Voltage Wiring Tabulation

It is expected that the above remaining drawings will be completed by 24 August 1961.

Approximately 24 purchase parts for the power supply have not yet been received, however, this is not delaying production at the present time.

The control panel is lacking 5 parts of which 4 have been shipped and the remaining item is scheduled for shipping on 21 August 1961.

SYSTEM INTERCONNECTION

The system interconnection and power distribution drawings have been released.

FRAME (ELECTRICAL)

The electrical schematic is still in preliminary sketch form, final drawings have not been started.

Purchase parts drawings have been completed.

FRAME (MECHANICAL)

All detail drawings have been released to Manufacturing and assembly drawings will be released during the next reporting period.

Truss

No change in status for this period.

Stress Analysis

No change in status for this period.

UNIT TEST CABLES

Drawings are 90% complete at this time, 100% completion is expected by 25 August 1961.